

Thermo Fisher Scientific

FIBER*Lite*™ F13-14x50c

Instruction Manual

50120007-2 August 2009

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Manufacturer:
Thermo Fisher Scientific
Robert-Bosch-Straße 1
D - 63505 Langenselbold
Germany

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Germany national toll free 0800 1 536 376
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Table of Contents

Preface

Before starting to use the rotor, read through these instruction manual carefully and follow the instructions.

The information contained in these instruction manuals is the property of Thermo Fisher Scientific; it is forbidden to copy or pass on this information without explicit approval.

Failure to follow the instructions and safety information in this instruction manual will result in the expiration of the seller's warranty.

Scope of Supply

Article Number		Quantity	Check
75003661	FIBER*Lite* ™ F13-14x50c	1	☐
76003500	Rubber seal grease	1	☐
70009824	Anti-corrosion oil	1	☐
50120007	Instruction Manual	1	☐

If any parts are missing, please contact the nearest Thermo Fisher Scientific representative.

Precautions

In order to ensure safe operation of the FIBER*Lite* ™ F13-14x50c, the following general safety regulations must be followed:

- Do not remove the magnet at the rotor bottom
- Do not use rotors which show any signs of corrosion and/or cracks.
- Use only with rotors that have been loaded properly.
- Never overload the rotor.

- Use only accessories which have been approved by Thermo Fisher Scientific. Exceptions to this rule are commercially available glass or plastic centrifuge tubes, provided they have been approved for the speed or the RCF value of the rotor.
- Please observe the safety instructions.

Please pay particular attention to the following aspects:

- Rotor installation: Check that the rotor is locked properly into place before operating the centrifuge.
- Always balance the samples.

Maximum sample density at maximum speed: $1{,}2\frac{g}{ml}$



This symbol refers to general hazards.
ATTENTION means that material damage could occur.
WARNING means that injuries or material damage or contamination could occur.



This symbol refers to biological hazards.
Observe the information contained in the instruction manual to keep yourself and your environment safe.

Rotor Specifications

Contents

Heraeus

Table 1-1. 230V 50Hz/60Hz ventilated

Centrifuge	Heraeus Multifuge X3	Heraeus Multifuge X3F	Heraeus Multifuge X1
Catalog #	75004500	75004530	75004210
Weight empty [kg] of rotor	7.16	7.16	7.16
Maximum permissible load [g]	14x75	14x75	14x75
maximum speed n_{max} [rpm]	10,000	10,000	8,500
maximum RCF value at n_{max}	17,105	17,105	12,359
max. / min. radius [cm]	8.3 /15.3	8.3 /15.3	8.3 /15.3
Pitch angle [°]	34	34	34
Accel. / braking time [s]	135 / 90	135 / 90	95 / 90
sample heating at n_{max} [° C] referred to ambient temperature of 23 °C, running time 60 minutes	21	21	19
aerosol-tight	no	no	no
max temperature for autoclaving °C	121	121	121

Table 1-2. 230V 50Hz/60Hz refrigerated

Centrifuge	Heraeus Multifuge X3R	Heraeus Multifuge X3FR	Heraeus Multifuge X1R
Catalog #	75004515	75004536	75004250
Weight empty [kg] of rotor	7.16	7.16	7.16
Maximum permissible load [g]	14x75	14x75	14x75
maximum speed n_{max} [rpm]	10,000	10,000	8,500
maximum RCF value at n_{max}	17,105	17,105	12,359
max. / min. radius [cm]	8.3 /15.3	8.3 /15.3	8.3 /15.3
Pitch angle [°]	34	34	34
Accel. / braking time [s]	115 / 90	115 / 90	95 / 90
aerosol-tight	no	no	no
max temperature for autoclaving °C	121	121	121

Table 1-3. 120V 60Hz ventilated

Centrifuge	Heraeus Multifuge X3	Heraeus Multifuge X3F	Heraeus Multifuge X1
Catalog #	75004501	75004531	75004211
Weight empty [kg] of rotor	7.16	7.16	7.16
Maximum permissible load [g]	14x75	14x75	14x75
maximum speed n_{max} [rpm]	9,250	9,250	8,500
maximum RCF value at n_{max}	14,636	14,636	12,359
max. / min. radius [cm]	8.3 /15.3	8.3 /15.3	8.3 /15.3
Pitch angle [°]	34	34	34
Accel. / braking time [s]	145 / 90	145 / 90	120 / 105
sample heating at n_{max} [° C] referred to ambient temperature of 23 °C, running time 60 minutes	19	19	21
aerosol-tight	no	no	no
max temperature for autoclaving °C	121	121	121

Table 1-4. 120V 60Hz refrigerated

Centrifuge	Heraeus Multifuge X3R	Heraeus Multifuge X3FR	Heraeus Multifuge X1R
Catalog #	75004516	75004537	75004251
Weight empty [kg] of rotor	7.16	7.16	7.16
Maximum permissible load [g]	14x75	14x75	14x75
maximum speed n_{max} [rpm]	9,250	9,250	8,500
maximum RCF value at n_{max}	14,636	14,636	12,359
max. / min. radius [cm]	8.3 /15.3	8.3 /15.3	8.3 /15.3
Pitch angle [°]	34	34	34
Accel. / braking time [s]	135 / 90	135 / 90	115 / 105
aerosol-tight	no	no	no
max temperature for autoclaving °C	121	121	121

Sorvall

Table 1-5. 230V 50Hz/60Hz ventilated

Centrifuge	Sorvall Legend XT	Sorvall Legend XF	Sorvall Legend X1
Catalog #	75004505	75004532	75004220
Weight empty [kg] of rotor	7.16	7.16	7.16
Maximum permissible load [g]	14x75	14x75	14x75
maximum speed n_{max} [rpm]	10,000	10,000	8,500
maximum RCF value at n_{max}	17,105	17,105	12,359
max. / min. radius [cm]	8.3 /15.3	8.3 /15.3	8.3 /15.3
Pitch angle [°]	34	34	34
Accel. / braking time [s]	135 / 90	135 / 90	95 / 90
sample heating at n_{max} [° C] referred to ambient temperature of 23 °C, running time 60 minutes	21	21	19
aerosol-tight	no	no	no
max temperature for autoclaving °C	121	121	121

Table 1-6. 230V 50Hz/60Hz refrigerated

Centrifuge	Sorvall Legend XTR	Sorvall Legend XFR	Sorvall Legend X1R
Catalog #	75004520	75004538	75004260
Weight empty [kg] of rotor	7.16	7.16	7.16
Maximum permissible load [g]	14x75	14x75	14x75
maximum speed n_{max} [rpm]	10,000	10,000	8,500
maximum RCF value at n_{max}	17,105	17,105	12,359
max. / min. radius [cm]	8.3 /15.3	8.3 /15.3	8.3 /15.3
Pitch angle [°]	34	34	34
Accel. / braking time [s]	115 / 90	115 / 90	95 / 90
aerosol-tight	no	no	no
max temperature for autoclaving °C	121	121	121

Table 1-7. 120V 60Hz ventilated

Centrifuge	Sorvall Legend XT	Sorvall Legend XF	Sorvall Legend X1
Catalog #	75004506	75004533	75004221
Weight empty [kg] of rotor	7.16	7.16	7.16
Maximum permissible load [g]	14x75	14x75	14x75
maximum speed n_{max} [rpm]	9,250	9,250	8,500
maximum RCF value at n_{max}	14,636	14,636	12,359
max. / min. radius [cm]	8.3 /15.3	8.3 /15.3	8.3 /15.3
Pitch angle [°]	34	34	34
Accel. / braking time [s]	145 / 90	145 / 90	120 / 105
sample heating at n_{max} [° C] referred to ambient temperature of 23 °C, running time 60 minutes	19	19	21
aerosol-tight	no	no	no
max temperature for autoclaving °C	121	121	121

Table 1-8. 120V 60Hz refrigerated

Centrifuge	Sorvall Legend XTR	Sorvall Legend XFR	Sorvall Legend X1R
Catalog #	75004521	75004539	75004261
Weight empty [kg] of rotor	7.16	7.16	7.16
Maximum permissible load [g]	14x75	14x75	14x75
maximum speed n_{max} [rpm]	9,250	9,250	8,500
maximum RCF value at n_{max}	14,636	14,636	12,359
max. / min. radius [cm]	8.3 /15.3	8.3 /15.3	8.3 /15.3
Pitch angle [°]	34	34	34
Accel. / braking time [s]	135 / 90	135 / 90	115 / 105
aerosol-tight	no	no	no
max temperature for autoclaving °C	121	121	121

Table 1-9. 100V 50Hz/60Hz ventilated

Centrifuge	Sorvall Legend XT	Sorvall Legend XF	Sorvall Legend X1
Catalog #	75004507	75004534	75004223
Weight empty [kg] of rotor	7.16	7.16	7.16
Maximum permissible load [g]	14x75	14x75	14x75
maximum speed n_{max} [rpm]	9,250	9,250	8,500
maximum RCF value at n_{max}	14,636	14,636	12,359
max. / min. radius [cm]	8.3 /15.3	8.3 /15.3	8.3 /15.3
Pitch angle [°]	34	34	34
Accel. / braking time [s]	150 / 90	150 / 90	120 / 105
sample heating at n_{max} [° C] referred to ambient temperature of 23 °C, running time 60 minutes	19	19	21
aerosol-tight	no	no	no
max temperature for autoclaving °C	121	121	121

Table 1-10. 100V 50Hz/60Hz refrigerated

Centrifuge	Sorvall Legend XTR	Sorvall Legend XFR	Sorvall Legend X1R
Catalog #	75004522	75004540	75004263
Weight empty [kg] of rotor	7.16	7.16	7.16
Maximum permissible load [g]	14x75	14x75	14x75
maximum speed n_{max} [rpm]	9,000	9,000	8,500
maximum RCF value at n_{max}	13,855	13,855	12,359
max. / min. radius [cm]	8.3 /15.3	8.3 /15.3	8.3 /15.3
Pitch angle [°]	34	34	34
Accel. / braking time [s]	120 / 80	120 / 80	115 / 105
aerosol-tight	no	no	no
max temperature for autoclaving °C	121	121	121

Accessories

Contents

Thermo Scientific General Purpose Rotors — *F13-14x50c Carbon Fiber Rotor*

F13-14x50c Fixed Angle Carbon Fiber Rotor

Rotor Specifications		
Capacity (ml)	14 x 50 conical	
Tube Dimensions (mm)	30 x 121	
Angle °	34	
Maximum Speed (rpm)	10000*	
K Factor	1547	
Net Weight (kg)	7,6	
* Max Speed may vary depending on centrifuge model		
RCF/Radius	**RCF (x g)**	**Radius (cm)**
Maximum	17.105	15,3
Minimum	9.271	8,3



F13-14x50c Carbon Fiber Rotor	
Cat. No.	**Description**
75003661	F13-14x50c Carbon Fiber Rotor

Accessories	
Cat. No.	**Description**
099-149027	Replacement Lid Assembly
021-149027	O-ring Refresher Kit

Tube Ordering Information

							Sealing Assembly Required:			Adapters Required:			Accessories Required:	
Cat. No.	Tube Vol. (ml)	Vol. Fill (ml)	Description	Qty.	Max. Speed (rpm)	Dims ØxL (mm)	Cat. No.	Qty /Pkg	Description	Cat. No.	Qty /Pkg	No. of Places		
334959	50	50	Nunc Conical	25	10.000	30x115	Included	25	PP Sealing	-	-	-	-	-
366036	15	15	Nunc Conical	50	-	17x120	Included	50	PP Sealing	75100378	2	1	-	-

AutoLock™

Contents

Rotor Installation

CAUTION Unapproved or incorrectly combined accessories can cause serious damage to the centrifuge.

This rotor is equipped with an AutoLock™-system.

This system is used to automatically lock the rotor to the centrifuge spindle. The rotor does not have to be bolted onto the centrifuge spindle.

Proceed as follows:

1. Open the lid of the centrifuge and if necessary remove any dust, foreign objects or residue from the chamber.
   AutoLock™ and o-ring must be clean and undamaged.

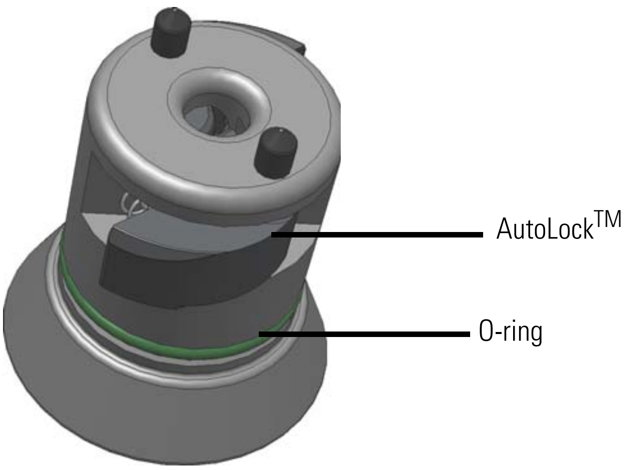


Figure 1. AutoLock™

2. Hold the rotor over the centrifuge spindle and let it slide slowly down the centrifuge spindle. The rotor clicks automatically into place.

CAUTION Do not force the rotor onto the centrifuge spindle.
If the rotor is very light, then it may be necessary to press it onto the centrifuge spindle with a small amount of pressure.

3. Check if the rotor is properly installed by lifting slightly on the handle. If the rotor can be pulled up, then it must be reclamped to the centrifuge spindle.

WARNUNG If the rotor cannot be properly locked in place after several attempts, then the AutoLock™ is defective and you are not permitted to operate the rotor.
Check for any damage to the rotor, damaged rotors must not be used.
Keep the hub area clear of objects.

CAUTION Check that the rotor is properly locked on the centrifuge spindle before each use by pulling it a its handle.

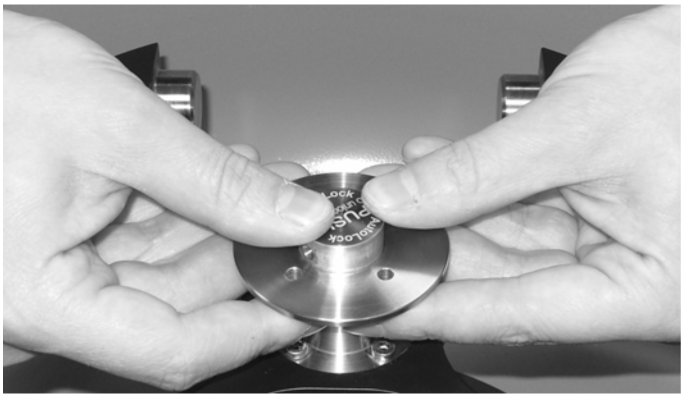
Be sure to check all seals before starting any aerosol-tight applications.

4. Close the centrifuge door.

Removing the Rotor

To remove the rotor, proceed as follows:

1. Open the centrifuge door.
2. Grab the rotor handle with both hands and press against the green AutoLock™ button. At the same time, pull the rotor directly upwards with both hands and remove it from the centrifuge spindle. Make sure not to jam the rotor while doing this.



Rotor Loading

Contents

Before Run

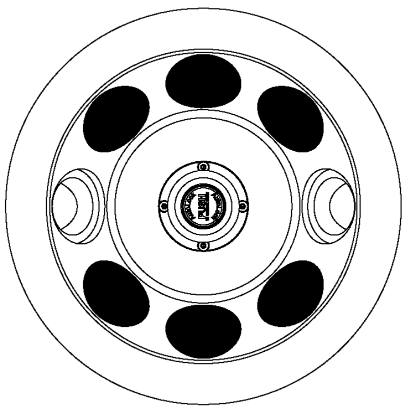
1. Please read and observe the safety instructions contained in these operating instructions and in the instructions for use.
2. Check the rotor and all accessory parts for damages such as cracks, scratches or traces of corrosion.
3. Check the rotor chamber, the centrifuge spindle and the AutoLock™.
4. Check the rotor’s suitability using the chemical compatibility chart on page B-1.
5. Make sure the tubes or bottles do not touch the lid.

Proper Loading

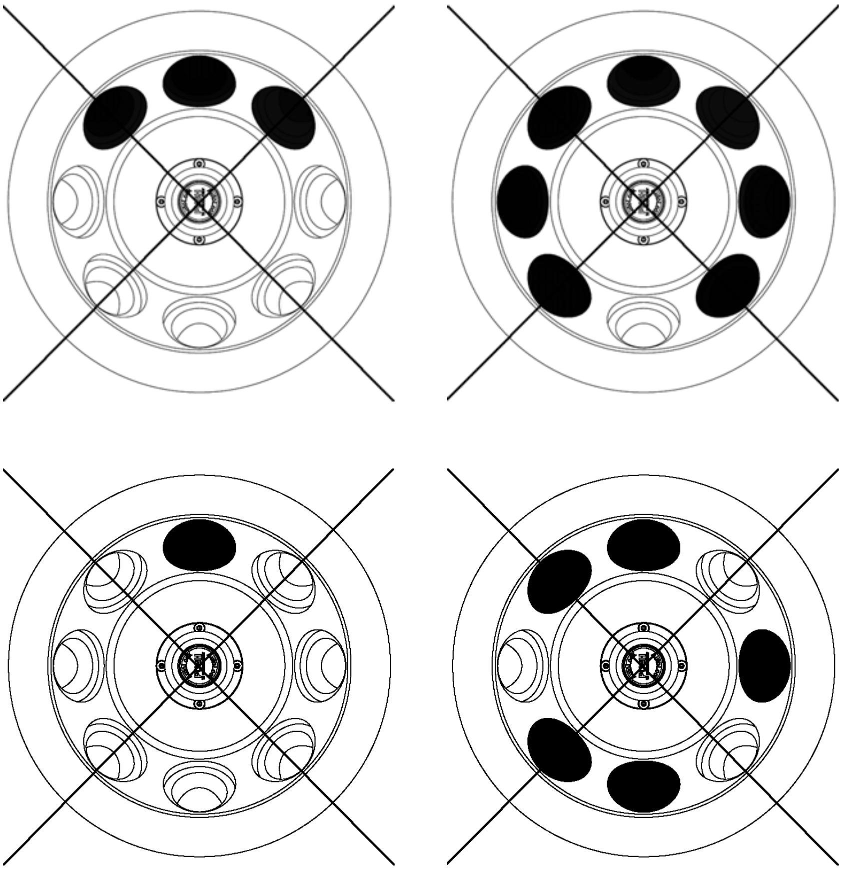
To ensure safe operation of the centrifuge, the rotor must be evenly loaded at all times.







Improper Loading



Maximum Loading

The rotor can run at high speeds. The rotor design has sufficient reserve stability even when spinning at top speed.

The safety system of the centrifuge requires that you symetrically balance the tubes in the rotor. This refers to each cavity.

There are two options available for centrifuging samples whose weight, including adaptor, exceeds the maximum permissible load:

- Reduce the fill level.
- Reduce the speed.
  Use this formular:

$$n_{adm} = n_{max}\sqrt{\frac{\text{Maximum permissible load}}{\text{Effective load}}}$$

n_{adm} = admissible speed
n_{max} = maximum speed

Aerosol-tight Applications

Contents

Basic Principles



CAUTION When centrifuging hazardous samples, do not open aerosol-tight rotors or buckets unless placed in a safety cabinet.
Always bear in mind the maximum permitted fill levels.



Be sure to check all seals before starting any aeorsol-tight applications.

- Check that the sample containers are well suited for the desired centrifugation process.

Fill Level

The tubes are only to be filled to a level which ensures that the sample is unable to reach the top of the tube during centrifugation. Therefore fill the tube only 2/3 of the rated level.

Checking the Aerosol-Tightness

The aerosol tightness testing of the rotors and buckets depend on the microbiological test process in accordance with the EN 61010-2-020 Appendix AA.

Whether or not a rotor is aerosol-tight depends primarily on proper handling.

Check as needed to make sure your rotor is aerosol-tight.

The careful inspection of the seals and seal surfaces for signs of wear and damage such as cracks, scratches and embrittlement is extremely important.

Aerosol-tight applications are not possible if the lids are open.

Aerosol-tightness requires the correct operation when filling the sample vessels and closing the rotor lid.

Quick Test

As a quick test, it is possible to test the aerosol-tightness of fixed-angle rotors using the following process:

1. Lubricate all seals lightly.
   Always use the special grease 7600 3500 when lubricating the seals.
2. Fill the cavities with approx. 10 ml of carbonated mineral water.
3. Close the rotor as explained in the handling instructions.
4. Shake the rotor vigorously using your hands.
   This releases the carbonic acid gas which is bound in the water, resulting in excess pressure. Do not apply pressure to the lid when doing so.

   Leaks can be detected by escaping water or the sound of escaping gas.

Replace the seals if you detect any leaks. Then repeat the test.

5. Dry the rotor, rotor lid and the cover seal.

CAUTION Prior to each use, the seals in the rotor are to be inspected in order to assure that they are correctly seated and are not worn or damaged.
Damaged seals are to be replaced immediately.
When loading the rotor, ensure that the rotor lid closes securely.
Damaged or clouded rotor covers are to be replaced immediately.

Maintenance and Care

Contents

Cleaning Intervalls

For the sake of personal, environmental, and material protection, it is your duty to clean and if necessary disinfect the centrifuge on a regular basis.

Maintenance	Recommended interval
Clean rotor chamber	daily or when polluted
Clean rotor	daily or when polluted
Accessories	daily or when polluted
Cabinet	Once per month
Ventilation holes	Every six months

CAUTION Refrain from using any other cleaning or decontamination procedure than those recommended here, if you are not entirely sure that the intended procedure is safe for the equipment.
Use only approved cleansers.
If in doubt, contact Thermo Fisher Scientific.

Cleaning

When cleaning centrifug

- Use warm water with a neutral solvent.
- Never use caustic cleaning agents such as soap suds, phosphoric acid, bleaching solutions or scrubbing powder.
- Rinse the cavities out thoroughly.
- Use a soft brush without metal bristles to remove stubborn residue.
- Afterwards rinse with distilled water.
- Place the rotors on a plastic grate with their cavities pointing down.
- If drying boxes are used, the temperature must never exceed 50 °C, since higher temperatures could damage the material and shorten the lifetime of the parts.
- Use only disinfectants with a pH of 6-8.
- Dry aluminum parts off with a soft cloth.
- After cleaning, treat the entire surface of aluminum parts with corrosion protection oil (7000 9824). Also treat the cavities with oil.
- Store the aluminum parts at room temperature or in a cold-storage room with the cavities pointing down.

CAUTION Before using any cleaning or decontamination methods except those recommended by the manufacturer, users should check with the manufacturer that the proposed method will not damage the equipment.

Clean centrifuge and accessories as follows:

1. Open the centrifuge.
2. Turn off the centrifuge.
3. Pull out the power supply plug.
4. Grasp the rotor with both hands and lift it vertically off the centrifuge spindle.
5. Remove the centrifuge tubes and adaptors.
6. Use a neutral cleaning agent with a pH value between 6 and 8 for cleaning.
7. Dry all of the rotors and accessorie after cleaning with a cloth or in a warm air cabinet at a maximum temperature of 50°C.
8. Clean the housing of the centrifuge as needed.

- After cleaning, treat the entire surface of aluminum parts with corrosion protection oil (7000 9824). Also treat the cavities with oil.
- Tread the boldof the swing out rotor with bold grease (75003786).

CAUTION When cleaning, do not allow liquids, especially organic solvents, to get on the drive shaft, the bearings, the AutoLock^{TM} or the locks.
Organic solvents break down the grease in the motor bearing. The drive shaft could freeze up.

After some applications their might be ice in the rotor chamber. Let the ice melt and drain it off. Clean the rotor chamber as described above.

Disinfection

Disinfect the centrifuge immediately whenever infectious material has spilled during centrifugation.

WARNING Infectious material can get into the centrifuge when a tube breaks or as a result of spills. Keep in mind the risk of infection when touching the rotor and take all necessary precautions.
In case of contamination, make sure that others are not put at risk.
Decontaminate the affected parts immediately.
Take other precautions if need be.

Use a sprayer whenever possible so that all surfaces are covered evenly.

The rotor chamber and the rotor should be treated preferably with a neutral disinfectant. A disinfectant spray would be most suitable for this purpose so that the rotor and accessory surfaces are covered evenly.

CAUTION Before using any cleaning or decontamination methods except those recommended by the manufacturer, users should check with the manufacturer that the proposed method will not damage the equipment.
Observe the safety precautions and handling instructions for the cleaning agents used.

Contact the Service Department of Thermo Fisher Scientific for questions regarding the use of other disinfectants.

Disinfect the rotor and accessories as follows:

1. Open the centrifuge.
2. Turn off the centrifuge.
3. Pull out the power supply plug.
4. Grasp the rotor with both hands and lift it vertically off the centrifuge spindle.
5. Remove the centrifuge tubes and adaptors and dispose of them or disinfect them.
6. Treat the rotor and accessories according to the instructions for the disinfectant (spray or soak in solution). Adhere strictly to the given application times.
7. Be sure the disinfectant can drain off the rotor.
8. Rinse the rotor and rotor lid thoroughly with water and then rub down.
9. Dispose of the disinfectant according to the applicable guidelines.
10. Dry all of the rotors and accessorie after cleaning with a cloth or in a warm air cabinet at a maximum temperature of 50°C.

- After cleaning, treat the entire surface of aluminum parts with corrosion protection oil (7000 9824). Also treat the cavities with oil.
- Tread the boldof the swing out rotor with bold grease (75003786).

Decontamination

Decantaminate the centrifuge immediately whenever radioactive material has spilled during centrifugation.

WARNING Radioactive material can get into the centrifuge when a tube breaks or as a result of spills. Keep in mind the risk of infection when touching the rotor and take all necessary precautions.
In case of contamination, make sure that others are not put at risk.
Decontaminate the affected parts immediately.
Take other precautions if need be.

CAUTION Before using any cleaning or decontamination methods except those recommended by the manufacturer, users should check with the manufacturer that the proposed method will not damage the equipment.

For general radioactive decontamination use a solution of equal parts of 70% ethanol, 10% SDS and water.

Disinfect the rotor and accessories as follows:

1. Open the centrifuge.
2. Turn off the centrifuge.
3. Pull out the power supply plug.
4. Grasp the rotor with both hands and lift it vertically off the centrifuge spindle.

5. Remove the centrifuge tubes and adaptors and dispose of them or disinfect them.
6. Rinse the rotor first with ethanol and then with de-ionized water.

- Adhere strictly to the given application times.

7. Be sure the decontamination solution can drain off the rotor.
8. Rinse the rotor and accessories thoroughly with water.
9. Dispose of the decontamination solution according to the applicable guidelines.
10. Dry all of the rotors and accessorie after cleaning with a cloth or in a warm air cabinet at a maximum temperature of 50°C.

- After cleaning, treat the entire surface of aluminum parts with corrosion protection oil (7000 9824). Also treat the cavities with oil.
- Tread the boldof the swing out rotor with bold grease (75003786).

Autoclaving

1. Before autoclaving clean rotor and accessories and described above.
2. Place the rotor on a flat surface.

- Rotors and adapter can beautoclaved at 121 °C.
- The maximum permissible autoclave cycle is 20 minutes at 121 °C.

Clean the rotor before autoclaving and rinse it with distilled water. Remove all accessories (tubes, adapters) from the rotor. Place the rotor on a flat surface.

Note No chemical additives are permitted in the steam.

CAUTION Never exceed the permitted temperature and duration when autoclaving. If the rotor shows signs of corrosion or wear, it must be replaced.

Service of Thermo Fisher Scientific

Thermo Fisher Scientific recommends having the centrifuge and accessories serviced once a year by an authorized service technician. The service technicians check the following:

- the electrical equipment
- the suitability of the set-up site
- the lid lock and the safety system
- the rotor
- the fixation of the rotor and the drive shaft

Thermo Fisher Scientific offers inspection and service contracts for this work.

RCF-Values

Speed (rpm)	R_{min}	R_{max}	RCF R_{min}	RCF R_{max}
300	8.3	15.3	8	15
400	8.3	15.3	15	27
500	8.3	15.3	23	43
600	8.3	15.3	33	62
700	8.3	15.3	45	84
800	8.3	15.3	59	109
900	8.3	15.3	75	139
1000	8.3	15.3	93	171
1100	8.3	15.3	112	207
1200	8.3	15.3	134	246
1300	8.3	15.3	157	289
1400	8.3	15.3	182	335
1500	8.3	15.3	209	385
1600	8.3	15.3	238	438
1700	8.3	15.3	268	494
1800	8.3	15.3	301	554
1900	8.3	15.3	335	618
2000	8.3	15.3	371	684
2100	8.3	15.3	409	754
2200	8.3	15.3	449	828
2300	8.3	15.3	491	905
2400	8.3	15.3	534	985
2500	8.3	15.3	580	1069
2600	8.3	15.3	627	1156
2700	8.3	15.3	676	1247
2800	8.3	15.3	728	1341
2900	8.3	15.3	780	1439
3000	8.3	15.3	835	1539
3100	8.3	15.3	892	1644

Speed (rpm)	R_{min}	R_{max}	RCF R_{min}	RCF R_{max}
3200	8.3	15.3	950	1752
3300	8.3	15.3	1011	1863
3400	8.3	15.3	1073	1977
3500	8.3	15.3	1137	2095
3600	8.3	15.3	1203	2217
3700	8.3	15.3	1270	2342
3800	8.3	15.3	1340	2470
3900	8.3	15.3	1411	2602
4000	8.3	15.3	1485	2737
4100	8.3	15.3	1560	2875
4200	8.3	15.3	1637	3017
4300	8.3	15.3	1716	3163
4400	8.3	15.3	1796	3312
4500	8.3	15.3	1879	3464
4600	8.3	15.3	1964	3620
4700	8.3	15.3	2050	3779
4800	8.3	15.3	2138	3941
4900	8.3	15.3	2228	4107
5000	8.3	15.3	2320	4276
5100	8.3	15.3	2414	4449
5200	8.3	15.3	2509	4625
5300	8.3	15.3	2607	4805
5400	8.3	15.3	2706	4988
5500	8.3	15.3	2807	5174
5600	8.3	15.3	2910	5364
5700	8.3	15.3	3015	5558
5800	8.3	15.3	3122	5754
5900	8.3	15.3	3230	5954
6000	8.3	15.3	3341	6158
6100	8.3	15.3	3453	6365
6200	8.3	15.3	3567	6575
6300	8.3	15.3	3683	6789
6400	8.3	15.3	3801	7006
6500	8.3	15.3	3921	7227
6600	8.3	15.3	4042	7451
6700	8.3	15.3	4166	7679
6800	8.3	15.3	4291	7910

Speed (rpm)	R_{min}	R_{max}	RCF R_{min}	RCF R_{max}
6900	8.3	15.3	4418	8144
7000	8.3	15.3	4547	8382
7100	8.3	15.3	4678	8623
7200	8.3	15.3	4810	8867
7300	8.3	15.3	4945	9115
7400	8.3	15.3	5081	9367
7500	8.3	15.3	5220	9622
7600	8.3	15.3	5360	9880
7700	8.3	15.3	5502	10142
7800	8.3	15.3	5646	10407
7900	8.3	15.3	5791	10675
8000	8.3	15.3	5939	10947
8100	8.3	15.3	6088	11223
8200	8.3	15.3	6239	11502
8300	8.3	15.3	6393	11784
8400	8.3	15.3	6548	12070
8500	8.3	15.3	6704	12359
8600	8.3	15.3	6863	12651
8700	8.3	15.3	7024	12947
8800	8.3	15.3	7186	13246
8900	8.3	15.3	7350	13549
9000	8.3	15.3	7516	13855
9100	8.3	15.3	7684	14165
9200	8.3	15.3	7854	14478
9300	8.3	15.3	8026	14794
9400	8.3	15.3	8199	15114
9500	8.3	15.3	8375	15438
9600	8.3	15.3	8552	15764
9700	8.3	15.3	8731	16094
9800	8.3	15.3	8912	16428
9900	8.3	15.3	9095	16765
10000	8.3	15.3	9279	17105

Chemical Compatibility Chart

CHEMICAL / MATERIAL	ALUMINUM	ANODIC COATING for ALUMINUM	BUNA N	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELRIN®	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL®	NYLON	PET*, POLYCLEAR®, CLEARCRIMP® CCCLEARCRIMP®	POLYALLOMER	POLYCARBONATE	POLYESTER, GLASS THERMOSET	POLYTHERMIDE	POLYRTHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULON A®, TEFLON®	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON®	VITON®
2-mercaptoethanol	S	S	U	-	S	M	S	-	S	U	S	S	U	S	S	-	S	S	S	S	U	S	S	S	S	S	S
Acetaldehyde	S	-	U	U	-	-	-	M	-	U	-	-	-	M	U	U	U	M	M	-	M	S	U	-	S	-	U
Acetone	M	S	U	U	S	U	M	S	S	U	U	S	U	S	U	U	U	S	S	U	U	S	M	M	S	U	U
Acetonitrile	S	S	U	-	S	M	S	-	S	S	U	S	U	M	U	U	-	S	M	U	U	S	S	S	S	U	U
Alconox®	U	U	S	-	S	S	S	-	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S	S	S	S	U
Allyl Alcohol	-	-	-	U	-	-	S	-	-	-	-	S	-	S	S	M	S	S	S	-	M	S	-	-	S	-	-
Aluminum Chloride	U	U	S	S	S	S	U	S	S	S	S	M	S	S	S	S	-	S	S	S	S	S	M	U	U	S	S
Formic Acid (100%)	-	S	M	U	-	-	U	-	-	-	-	U	-	S	M	U	U	S	S	-	U	S	-	U	S	-	U
Ammonium Acetate	S	S	U	-	S	S	S	-	S	S	S	S	S	S	S	U	-	S	S	S	S	S	S	S	S	S	S
Ammonium Carbonate	M	S	U	S	S	S	S	S	S	S	S	S	S	S	U	U	-	S	S	S	S	S	S	M	S	S	S
Ammonium Hydroxide (10%)	U	U	S	U	S	S	M	S	S	S	S	S	-	S	U	M	S	S	S	S	S	S	S	S	S	M	S
Ammonium Hydroxide (28%)	U	U	S	U	S	U	M	S	S	S	S	S	U	S	U	M	S	S	S	S	S	S	S	S	S	M	S
Ammonium Hydroxide (conc.)	U	U	U	U	S	U	M	S	-	S	-	S	U	S	U	U	S	S	S	-	M	S	S	S	S	-	U
Ammonium Phosphate	U	-	S	-	S	S	S	S	S	S	S	S	-	S	S	M	-	S	S	S	S	S	S	M	S	S	S
Ammonium Sulfate	U	M	S	-	S	S	U	S	S	S	S	S	S	S	S	S	-	S	S	S	S	S	S	U	S	S	U
Amyl Alcohol	S	-	M	U	-	-	S	S	-	M	-	S	-	M	S	S	S	S	M	-	-	-	U	-	S	-	M
Aniline	S	S	U	U	S	U	S	M	S	U	U	U	U	U	U	U	-	S	M	U	U	S	S	S	S	U	S
Sodium Hydroxide (<1%)	U	-	M	S	S	S	-	-	S	M	S	S	-	S	M	M	S	S	S	S	S	S	M	S	S	-	U
Sodium Hydroxide (10%)	U	-	M	U	-	-	U	-	M	M	S	S	U	S	U	U	S	S	S	S	S	S	M	S	S	-	U
Barium Salts	M	U	S	-	S	S	S	S	S	S	S	S	S	S	S	M	-	S	S	S	S	S	S	M	S	S	S
Benzene	S	S	U	U	S	U	M	U	S	U	U	S	U	U	U	M	U	M	U	U	U	S	U	U	S	U	S

CHEMICAL / MATERIAL	ALUMINUM	ANODIC COATING for ALUMINUM	BUNA N	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELRIN®	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL®	NYLON	PET*, POLYCLEAR®, CLEARCRIMP®CCCLEARCRIMP®	POLYALLOMER	POLYCARBONATE	POLYESTER, GLASS THERMOSET	POLYTHERMIDE	POLYRTHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULON A®, TEFLON®	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON®	VITON®
Benzyl Alcohol	S	-	U	U	-	-	M	M	-	M	-	S	U	U	U	U	U	U	U	-	M	S	M	-	S	-	S
Boric Acid	U	S	S	M	S	S	U	S	S	S	S	S	S	S	S	S	U	S	S	S	S	S	S	S	S	S	S
Cesium Acetate	M	-	S	-	S	S	S	-	S	S	S	S	-	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Cesium Bromide	M	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Cesium Chloride	M	S	S	U	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Cesium Formate	M	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Cesium Iodide	M	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Cesium Sulfate	M	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Chloroform	U	U	U	U	S	S	M	U	S	U	U	M	U	M	U	U	U	M	M	U	U	S	U	U	U	M	S
Chromic Acid (10%)	U	-	U	U	S	U	U	-	S	S	S	U	S	S	M	U	M	S	S	U	M	S	M	U	S	S	S
Chromic Acid (50%)	U	-	U	U	-	U	U	-	-	-	S	U	U	S	M	U	M	S	S	U	M	S	-	U	M	-	S
Cresol Mixture	S	S	U	-	-	-	S	-	S	U	U	U	U	U	U	-	-	U	U	-	U	S	S	S	S	U	S
Cyclohexane	S	S	S	-	S	S	S	U	S	U	S	S	U	U	U	M	S	M	U	M	M	S	U	M	M	U	S
Deoxycholate	S	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	S	S	S	S
Distilled Water	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Dextran	M	S	S	S	S	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	M	S	S	S
Diethyl Ether	S	S	U	U	S	S	S	U	S	U	U	S	U	U	U	U	U	U	U	U	U	S	S	S	S	M	U
Diethyl Ketone	S	-	U	U	-	-	M	-	S	U	-	S	-	M	U	U	U	M	M	-	U	S	-	-	S	U	U
Diethylpyrocarbonate	S	S	U	-	S	S	S	-	S	S	U	S	U	S	U	-	-	S	S	S	M	S	S	S	S	S	S
Dimethylsulfoxide	S	S	U	U	S	S	S	-	S	U	S	S	U	S	U	U	-	S	S	U	U	S	S	S	S	U	U
Dioxane	M	S	U	U	S	S	M	M	S	U	U	S	U	M	U	U	-	M	M	M	U	S	S	S	S	U	U
Ferric Chloride	U	U	S	-	-	-	M	S	-	M	-	S	-	S	-	-	-	S	S	-	-	-	M	U	S	-	S
Acetic Acid (Glacial)	S	S	U	U	S	S	U	M	S	U	S	U	U	U	U	U	M	S	U	M	U	S	U	U	S	-	U
Acetic Acid (5%)	S	S	M	S	S	S	M	S	S	S	S	S	M	S	S	S	S	S	S	S	M	S	S	M	S	S	M
Acetic Acid (60%)	S	S	U	U	S	S	U	-	S	M	S	U	U	M	U	S	M	S	M	S	M	S	M	U	S	M	U
Ethyl Acetate	M	M	U	U	S	S	M	M	S	S	U	S	U	M	U	U	-	S	S	U	U	S	M	M	S	U	U
Ethyl Alcohol (50%)	S	S	S	S	S	S	M	S	S	S	S	S	U	S	U	S	S	S	S	S	S	S	S	M	S	M	U
Ethyl Alcohol (95%)	S	S	S	U	S	S	M	S	S	S	S	S	U	S	U	-	S	S	S	M	S	S	S	U	S	M	U
Ethylene Dichloride	S	-	U	U	-	-	S	M	-	U	U	S	U	U	U	U	U	U	U	-	U	S	U	-	S	-	S
Ethylene Glycol	S	S	S	S	S	S	S	S	S	S	S	S	-	S	U	S	S	S	S	S	S	S	S	M	S	M	S

CHEMICAL / MATERIAL	ALUMINUM	ANODIC COATING for ALUMINUM	BUNA N	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELRIN®	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL®	NYLON	PET*, POLYCLEAR®, CLEARCRIMP®CCCLEARCRIMP®	POLYALLOMER	POLYCARBONATE	POLYESTER, GLASS THERMOSET	POLYTHERMIDE	POLYRTHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULON A®, TEFLON®	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON®	VITON®
Ethylene Oxide Vapor	S	-	U	-	-	U	-	-	S	U	-	S	-	S	M	-	-	S	S	S	U	S	U	S	S	S	U
Ficoll-Hypaque®	M	S	S	-	S	S	S	-	S	S	S	S	-	S	S	-	S	S	S	S	S	S	S	M	S	S	S
Hydrofluoric Acid (10%)	U	U	U	M	-	-	U	-	-	U	U	S	-	S	M	U	S	S	S	S	M	S	U	U	U	-	-
Hydrofluoric Acid (50%)	U	U	U	U	-	-	U	-	-	U	U	U	U	S	U	U	U	S	S	M	M	S	U	U	U	-	M
Hydrochloric Acid (conc.)	U	U	U	U	-	U	U	M	-	U	M	U	U	M	U	U	U	-	S	-	U	S	U	U	U	-	-
Formaldehyde (40%)	M	M	M	S	S	S	S	M	S	S	S	S	M	S	S	S	U	S	S	M	S	S	S	M	S	M	U
Glutaraldehyde	S	S	S	S	-	-	S	-	S	S	S	S	S	S	S	-	-	S	S	S	-	-	S	S	S	-	-
Glycerol	M	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	-	S	S	S	S	S	S	S	S	S	S
Guanidine Hydrochloride	U	U	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	U	S	S	S
Haemo-Sol®	S	S	S	-	-	-	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	S	S	S	S
Hexane	S	S	S	-	S	S	S	-	S	S	U	S	U	M	U	S	S	U	S	S	M	S	U	S	S	U	S
Isobutyl Alcohol	-	-	M	U	-	-	S	S	-	U	-	S	U	S	S	M	S	S	S	-	S	S	S	-	S	-	S
Isopropyl Alcohol	M	M	M	U	S	S	S	S	S	U	S	S	U	S	U	M	S	S	S	S	S	S	S	M	M	M	S
Iodoacetic Acid	S	S	M	-	S	S	S	-	S	M	S	S	M	S	S	-	M	S	S	S	S	S	M	S	S	M	M
Potassium Bromide	U	S	S	-	S	S	S	-	S	S	S	S	S	S	S	S	S	S	S	-	S	S	S	M	S	S	S
Potassium Carbonate	M	U	S	S	S	S	S	-	S	S	S	S	S	S	U	S	S	S	S	S	S	S	S	S	S	S	S
Potassium Chloride	U	S	S	-	S	S	S	S	S	S	S	S	S	S	S	-	S	S	S	S	S	S	S	U	S	S	S
Potassium Hydroxide (5%)	U	U	S	S	S	S	M	-	S	S	S	S	-	S	U	S	S	S	S	S	S	S	M	U	M	S	U
Potassium Hydroxide (conc.)	U	U	M	U	-	-	M	-	M	S	S	-	U	M	U	U	U	S	M	-	M	U	-	U	U	-	U
Potassium Permanganate	S	S	S	-	S	S	S	-	S	S	S	U	S	S	S	M	-	S	M	S	U	S	S	M	S	U	S
Calcium Chloride	M	U	S	S	S	S	S	S	S	S	S	S	S	S	M	S	-	S	S	S	S	S	S	M	S	S	S
Calcium Hypochlorite	M	-	U	-	S	M	M	S	-	M	-	S	-	S	M	S	-	S	S	S	M	S	M	U	S	-	S
Kerosene	S	S	S	-	S	S	S	U	S	M	U	S	U	M	M	S	-	M	M	M	S	S	U	S	S	U	S
Sodium Chloride (10%)	S	-	S	S	S	S	S	S	-	-	-	S	S	S	S	S	-	S	S	S	S	-	S	S	M	-	S
Sodium Chloride (sat'd)	U	-	S	U	S	S	S	-	-	-	-	S	S	S	S	S	-	S	S	-	S	-	S	S	M	-	S
Carbon Tetrachloride	U	U	M	S	S	U	M	U	S	U	U	S	U	M	U	S	S	M	M	S	M	M	M	M	U	S	S
Aqua Regia	U	-	U	U	-	-	U	-	-	-	-	-	U	U	U	U	U	U	U	-	-	-	-	-	S	-	M
Solution 555 (20%)	S	S	S	-	-	-	S	-	S	S	S	S	S	S	S	-	-	S	S	S	-	S	S	S	S	S	S
Magnesium Chloride	M	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	M	S	S	S
Mercaptoacetic Acid	U	S	U	-	S	M	S	-	S	M	S	U	U	U	U	-	S	U	U	S	M	S	U	S	S	S	S

CHEMICAL / MATERIAL	ALUMINUM	ANODIC COATING for ALUMINUM	BUNA N	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELRIN®	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL®	NYLON	PET*, POLYCLEAR®, CLEARCRIMP® CCCLEARCRIMP®	POLYALLOMER	POLYCARBONATE	POLYESTER, GLASS THERMOSET	POLYTHERMIDE	POLYRTHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULON A®, TEFLON®	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON®	VITON®
Methyl Alcohol	S	S	S	U	S	S	M	S	S	S	S	S	U	S	U	M	S	S	S	S	S	S	S	M	S	M	U
Methylene Chloride	U	U	U	U	M	S	S	U	S	U	U	S	U	U	U	U	U	M	U	U	U	S	S	M	U	S	U
Methyl Ethyl Ketone	S	S	U	U	S	S	M	S	S	U	U	S	U	S	U	U	U	S	S	U	U	S	S	S	S	U	U
Metrizamide®	M	S	S	-	S	S	S	-	S	S	S	S	-	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Lactic Acid (100%)	-	-	S	-	-	-	-	-	-	M	S	U	-	S	S	S	M	S	S	-	M	S	M	S	S	-	S
Lactic Acid (20%)	-	-	S	S	-	-	-	-	-	M	S	M	-	S	S	S	S	S	S	S	M	S	M	S	S	-	S
N-Butyl Alcohol	S	-	S	U	-	-	S	-	-	S	M	-	U	S	M	S	S	S	S	M	M	S	M	-	S	-	S
N-Butyl Phthalate	S	S	U	-	S	S	S	-	S	U	U	S	U	U	U	M	-	U	U	S	U	S	M	M	S	U	S
N, N-Dimethylformamide	S	S	S	U	S	M	S	-	S	S	U	S	U	S	U	U	-	S	S	U	U	S	M	S	S	S	U
Sodium Borate	M	S	S	S	S	S	S	S	S	S	S	U	S	S	S	S	-	S	S	S	S	S	S	M	S	S	S
Sodium Bromide	U	S	S	-	S	S	S	-	S	S	S	S	S	S	S	S	-	S	S	S	S	S	S	M	S	S	S
Sodium Carbonate (2%)	M	U	S	S	S	S	S	S	S	S	S	S	S	S	U	S	S	S	S	S	S	S	S	S	S	S	S
Sodium Dodecyl Sulfate	S	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	S	S	S	S	S	S	S	S	S	S	S
Sodium Hypochlorite (5%)	U	U	M	S	S	M	U	S	S	M	S	S	S	M	S	S	S	S	M	S	S	S	M	U	S	M	S
Sodium Iodide	M	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Sodium Nitrate	S	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	-	S	S	S	S	S	U	S	S	S	S
Sodium Sulfate	U	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	M	S	S	S
Sodium Sulfide	S	-	S	S	-	-	-	S	-	-	-	S	S	S	U	U	-	-	S	-	-	-	S	S	M	-	S
Sodium Sulfite	S	S	S	-	S	S	S	S	M	S	S	S	S	S	S	M	-	S	S	S	S	S	S	S	S	S	S
Nickel Salts	U	S	S	S	S	S	-	S	S	S	-	-	S	S	S	S	-	S	S	S	S	S	S	M	S	S	S
Oils (Petroleum)	S	S	S	-	-	-	S	U	S	S	S	S	U	U	M	S	M	U	U	S	S	S	U	S	S	S	S
Oils (Other)	S	-	S	-	-	-	S	M	S	S	S	S	U	S	S	S	S	U	S	S	S	S	-	S	S	M	S
Oleic Acid	S	-	U	S	S	S	U	U	S	U	S	S	M	S	S	S	S	S	S	S	S	S	M	U	S	M	M
Oxalic Acid	U	U	M	S	S	S	U	S	S	S	S	S	U	S	U	S	S	S	S	S	S	S	S	U	M	S	S
Perchloric Acid (10%)	U	-	U	-	S	U	U	-	S	M	M	-	-	M	U	M	S	M	M	-	M	S	U	-	S	-	S
Perchloric Acid (70%)	U	U	U	-	-	U	U	-	S	U	M	U	U	M	U	U	U	M	M	U	M	S	U	U	S	U	S
Phenol (5%)	U	S	U	-	S	M	M	-	S	U	M	U	U	S	U	M	S	M	S	U	U	S	U	M	M	M	S
Phenol (50%)	U	S	U	-	S	U	M	-	S	U	M	U	U	U	U	U	S	U	M	U	U	S	U	U	U	M	S
Phosphoric Acid (10%)	U	U	M	S	S	S	U	S	S	S	S	U	-	S	S	S	S	S	S	S	S	S	U	M	U	S	S
Phosphoric Acid (conc.)	U	U	M	M	-	-	U	S	-	M	S	U	U	M	M	S	S	S	M	S	M	S	U	M	U	-	S

CHEMICAL / MATERIAL	ALUMINUM	ANODIC COATING for ALUMINUM	BUNA N	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELRIN®	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL®	NYLON	PET*, POLYCLEAR®, CLEARCRIMP®CCCLEARCRIMP®	POLYALLOMER	POLYCARBONATE	POLYESTER, GLASS THERMOSET	POLYTHERMIDE	POLYRTHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULON A®, TEFLON®	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON®	VITON®
Physiologic Media (Serum, Urine)	M	S	S	S	-	-	S	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Picric Acid	S	S	U	-	S	M	S	S	S	M	S	U	S	S	S	U	S	S	S	S	U	S	U	M	S	M	S
Pyridine (50%)	U	S	U	U	S	U	U	-	U	S	S	U	U	M	U	U	-	U	S	M	U	S	S	U	U	U	U
Rubidium Bromide	M	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Rubidium Chloride	M	S	S	-	S	S	S	-	S	S	S	S	S	S	S	-	-	S	S	S	S	S	S	M	S	S	S
Sucrose	M	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Sucrose, Alkaline	M	S	S	-	S	S	S	-	S	S	S	S	S	S	U	S	S	S	S	S	S	S	S	M	S	S	S
Sulfosalicylic Acid	U	U	S	S	S	S	S	-	S	S	S	U	S	S	S	-	S	S	S	-	S	S	S	U	S	S	S
Nitric Acid (10%)	U	S	U	S	S	U	U	-	S	U	S	U	-	S	S	S	S	S	S	S	S	S	M	S	S	S	S
Nitric Acid (50%)	U	S	U	M	S	U	U	-	S	U	S	U	U	M	M	U	M	M	M	S	S	S	U	S	S	M	S
Nitric Acid (95%)	U	-	U	U	-	U	U	-	-	U	U	U	U	M	U	U	U	U	M	U	U	S	U	S	S	-	S
Hydrochloric Acid (10%)	U	U	M	S	S	S	U	-	S	S	S	U	U	S	U	S	S	S	S	S	S	S	S	U	M	S	S
Hydrochloric Acid (50%)	U	U	U	U	S	U	U	-	S	M	S	U	U	M	U	U	S	S	S	S	M	S	M	U	U	M	M
Sulfuric Acid (10%)	M	U	U	S	S	U	U	-	S	S	M	U	S	S	S	S	S	S	S	S	S	S	U	U	U	S	S
Sulfuric Acid (50%)	M	U	U	U	S	U	U	-	S	S	M	U	U	S	U	U	M	S	S	S	S	S	U	U	U	M	S
Sulfuric Acid (conc.)	M	U	U	U	-	U	U	M	-	-	M	U	U	S	U	U	U	M	S	U	M	S	U	U	U	-	S
Stearic Acid	S	-	S	-	-	-	S	M	S	S	S	S	-	S	S	S	S	S	S	S	S	S	M	M	S	S	S
Tetrahydrofuran	S	S	U	U	S	U	U	M	S	U	U	S	U	U	U	-	M	U	U	U	U	S	U	S	S	U	U
Toluene	S	S	U	U	S	S	M	U	S	U	U	S	U	U	U	S	U	M	U	U	U	S	U	S	U	U	M
Trichloroacetic Acid	U	U	U	-	S	S	U	M	S	U	S	U	U	S	M	-	M	S	S	U	U	S	U	U	U	M	U
Trichloroethane	S	-	U	-	-	-	M	U	-	U	-	S	U	U	U	U	U	U	U	U	U	S	U	-	S	-	S
Trichloroethylene	-	-	U	U	-	-	-	U	-	U	-	S	U	U	U	U	U	U	U	U	U	S	U	-	U	-	S
Trisodium Phosphate	-	-	-	S	-	-	M	-	-	-	-	-	-	S	-	-	S	S	S	-	-	S	-	-	S	-	S
Tris Buffer (neutral pH)	U	S	S	S	S	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Triton X-100®	S	S	S	-	S	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Urea	S	-	U	S	S	S	S	-	-	-	-	S	S	S	M	S	S	S	S	-	S	S	S	M	S	-	S
Hydrogen Peroxide (10%)	U	U	M	S	S	U	U	-	S	S	S	U	S	S	S	M	U	S	S	S	S	S	S	M	S	U	S
Hydrogen Peroxide (3%)	S	M	S	S	S	-	S	-	S	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S	S	S
Xylene	S	S	U	S	S	S	M	U	S	U	U	U	U	U	U	M	U	M	U	U	U	S	U	M	S	U	S
Zinc Chloride	U	U	S	S	S	S	U	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	U	S	S	S

CHEMICAL / MATERIAL	ALUMINUM	ANODIC COATING for ALUMINUM	BUNA N	CELLULOSE ACETATE BUTYRATE	POLYURETHANE ROTOR PAINT	COMPOSITE Carbon Fiber/Epoxy	DELRIN®	ETHYLENE PROPYLENE	GLASS	NEOPRENE	NORYL®	NYLON	PET*, POLYCLEAR®,CLEARCRIMP®CCCLEARCRIMP®	POLYALLOMER	POLYCARBONATE	POLYESTER, GLASS THERMOSET	POLYTHERMIDE	POLYRTHYLENE	POLYPROPYLENE	POLYSULFONE	POLYVINYL CHLORIDE	RULON A®, TEFLON®	SILICONE RUBBER	STAINLESS STEEL	TITANIUM	TYGON®	VITON®
Zinc Sulfate	U	S	S	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Citric Acid (10%)	M	S	S	M	S	S	M	S	S	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S	S	S	S

*Polyethyleneterephthalate

Key

S Satisfactory

M = Moderate attack, may be satisfactory for use in centrifuge depending on length of exposure, speed involved, etc.; suggest testing under actual conditions of use.

U Unsatisfactory, not recommended.

-- Performance unknown; suggest testing, using sample to avoid loss of valuable material.

Chemical resistance data is included only as a guide to product use. Because no organized chemical resistance data exists for materials under the stress of centrifugation, when in doubt we recommend pretesting sample lots.

Warranty and recommended Service Life

Rotor Type	Warranty Years	Recommended Retirement After Years
FIBER*Lite* ^{TM} F13-14x50c	15	-

Rotor Type	Warranty	Recommended Retirement After Years
O-ringe, tubes, bottles	30 Days	1

Thermo Fisher Scientific warrants that the Products will operate substantially in conformity with Thermo Fisher Scientific's published specifications, when subjected to normal, proper and intended usage by properly trained personnel, for a period of 5 YEARS after shipment to the Customer (the "Warranty Period"). Thermo Fisher Scientific agrees during the Warranty Period, provided it is promptly notified in writing upon the discovery of any material defect and further provided that all costs of returning the defective Goods to Thermo Fisher Scientific are pre-paid by the Customer, to repair or replace, at Thermo Fisher Scientific's option, defective Goods so as to cause the same to operate in substantial conformance with the said specifications. Replacement parts may be new or refurbished, at the election of Thermo Fisher Scientific. All replaced parts shall become the property of Thermo Fisher Scientific. Thermo Fisher Scientific's sole liability with respect to equipment, materials, parts or software furnished to Thermo Fisher Scientific by its third party suppliers shall be limited to the assignment by Thermo Fisher Scientific to the Customer of any such third party supplier's warranty, to the extent the same is assignable. In no event shall Thermo Fisher Scientific have any obligation to make repairs, replacements or corrections required, in whole or in part, as the result of: (i) normal wear and tear, (ii.) accident, disaster or event of force majeure, (iii) misuse, fault or negligence of or by or on behalf of the Customer, (iv) use of the Goods in a manner for which they were not designed, (v) causes external to the Goods such as, but not limited to, power failure or electrical power surges or (vi) use of the Goods in combination with equipment or software not supplied by Thermo Fisher Scientific. If Thermo Fisher Scientific determines that Goods for which the Customer has requested warranty services are not covered by the warranty hereunder, the Customer shall pay or reimburse Thermo Fisher Scientific for all costs of investigating and responding to such request at Thermo Fisher Scientific's then prevailing time and material rates. If Thermo Fisher Scientific provides repair services or replacement parts that are not covered by the warranty provided in this Clause, the Customer shall pay Thermo Fisher Scientific therefor at Thermo Fisher Scientific's then prevailing time and materials rates. Any installation, maintenance, repair, service, relocation or alteration to or of, or other tampering with, the Goods, performed by any person or entity other than Thermo Fisher Scientific without Thermo Fisher Scientific's prior written approval, or any use of replacement parts not supplied by Thermo Fisher Scientific, shall immediately void and cancel all warranties with respect to the affected Goods.

Contact Information

United States	866-9-THERMO
	+1 866 984 3766
Canada	+1 866 984 3766
Austria	+43 1 801 400
Belgium	+32 2 482 30 30
Germany	08001 536 376
	+49 6184 90 6940
France	+33 2 2803 2180
	+33 2 2803 2000
Italy	+39 02 02 95059 341
Netherlands	+31 76 571 4440
Nordic / Baltic Countries	+35 89 329 100
Russia	+7 (812) 703 42 15

Spain	+34 932 23 09 18
Portugal	+34 932 23 09 18
Switzerland	+41 44 454 12 12
UK / Ireland	+44 870 609 9203
China	+86 21 6865 4588
	+86 10 8419 3588
India	+91 22 6716 2200
Japan	+81 45 453 9220
Other Asian Countries	+852 2885 4613
Latin America	+1 866 984 3766
Other Countries	+49 6184 90 6940
	+33 2 2803 2180

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